

## Sr-Nd and Pb isotopic portray of the Crozet plume

C. M. MEYZEN<sup>1\*</sup>, A. MARZOLI<sup>1</sup>, G. BELLINI<sup>1</sup>  
AND G. LEVRESSE<sup>2</sup>

<sup>1</sup> Università degli Studi di Padova, Via G. Gradenigo, 6, 35131 Padova, Italia (\* correspondence: christine.meyzen@unipd.it, andrea.marzoli@unipd.it, giuliano.bellieni@unipd.it)

<sup>2</sup> Centro de Geociencias, Universidad Nacional Autónoma de México (UNAM), Blvd. Juriquilla No. 3001, Querétaro, 76230, México (glevresse@geociencias.unam.mx)

New Sr, Nd and Pb isotope data are presented for alkali basalts of the sub-aerial eruptive stage of East Island. This landmass is the second largest of the easternmost and oldest island group of Crozet archipelago. Its lavas are remarkably isotopically homogeneous in spanning a narrow range of isotopic variability. They occupy an intermediate position among the isotopic variability spectrum defined by Earth's oceanic island basalts. They fall in a mixing triangular shape formed by the end-member mantle components: a Depleted Mantle (DM) component, an Enriched Mantle (EM) component and a common component. The mixture domination by a large fraction of the common component suggests an isolation of the East island mantle source from homogenizing effects of convection mixing and recycling processes for Ga timescales. A possible inter-island source heterogeneity, such as those identified in the Pacific and Atlantic oceans, could exist at Crozet islands, as the younger western group is more isotopically depleted in Sr-Nd than the eastern one. Overall, lavas from Crozet islands share Pb-Sr-Nd isotopic affinities with their Reunion-Mauritius counterparts, but differ from those of Marion-Prince Edward and Kerguelen volcanoes. However, we cannot reject the seismic inference that Crozet volcanism is a secondary expression of Kerguelen hotspot, if its compositional bottom layer is heterogeneous. Finally, the Sr-Nd-Pb isotopic signatures of basalts north of the Crozet Bank along the Southwest Indian Ridge show no affinity with those of East island. The seismically rideward flow identified must thus be composed of isotopically distinct material from that of feeding East island volcanism.

## Convergence in chemical compositions between aqueous fluid and silicate melt in the peridotite-H<sub>2</sub>O system

KENJI MIBE<sup>1\*</sup>, TATSUHIKO KAWAMOTO<sup>2</sup>  
AND SHIGEAKI ONO<sup>3</sup>

<sup>1</sup>Earthquake Research Institute, University of Tokyo, Tokyo 113-0032, Japan (\*correspondence: mibe@eri.u-tokyo.ac.jp)

<sup>2</sup>Institute for Geothermal Sciences, Graduate School of Science, Kyoto University, Kyoto, 606-8502, Japan (kawamoto@bep.vgs.kyoto-u.ac.jp)

<sup>3</sup>Institute for Research on Earth Evolution, Japan Agency for Marine-Earth Science and Technology, Kanagawa, Japan. (sono@sono@jamstec.go.jp)

In order to understand the magma genesis and chemical differentiation in the Earth's interior, we have been investigating the stability fields and chemical compositions of aqueous fluid, silicate melt, and supercritical fluid magma in the peridotite-H<sub>2</sub>O system. Mibe *et al.* [1] found that the second critical endpoint occurred at around 3.8 GPa in the system peridotite-H<sub>2</sub>O. Using the quenched recovered samples obtained by Mibe *et al.* [1], we determined the chemical composition of aqueous fluid, silicate melt, and supercritical fluid in the vicinity of the second critical endpoint in the system peridotite-H<sub>2</sub>O by EPMA analyses. A 10- to 30-um diameter electron beam was used to obtain the composition of quenched materials from aqueous fluid, silicate melt, and supercritical fluid.

In the run at 3.3 GPa, the composition of aqueous fluid was high-Mg dacitic, whereas the composition of silicate melt was peridotitic. In the run at 3.6 GPa, the composition of aqueous fluid was high-Mg andesitic, whereas the composition of silicate melt was komatiitic. At 4 GPa (i.e., above the second critical endpoint), the composition of supercritical fluid magma was basaltic. Our results clearly indicate that the compositions of aqueous fluid and silicate melt converge at around 3.8 GPa, which is consistent with the results by Mibe *et al.* [1].

[1] Mibe *et al.* (2007) *J Geophys Res* **112**:B03201.